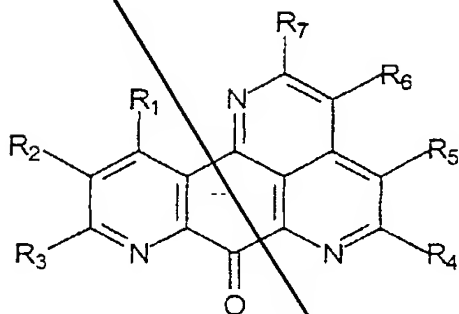


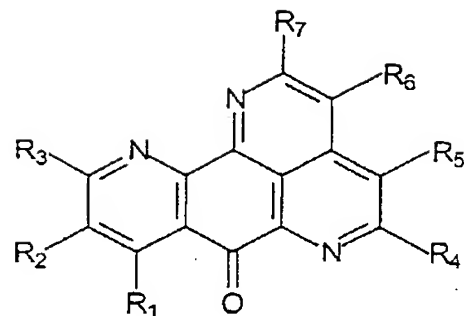
CLAIMS

1. Compounds of formulae:



Formula I

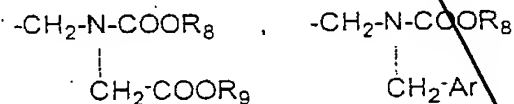
and



Formula Ia

in which:

$R_1, R_2, R_3, R_4$  and  $R_5$  are selected from hydrogen, halogens,  $C_1$ - $C_6$  alkyl groups, hydroxyl,  $-CHO$ ,  $-OR_8$ ,  $-COOH$ ,  $-CN$ ,  $-CO_2R_8$ ,  $-CONHR_8$ ,  $-CONR_8R_9$ ,  $-NH_2$ ,  $-NHR_8$ ,  $-N(R_8)_2$ ,  $-NH-CH_2-CH_2-N(CH_3)_2$ ,  $-NH-CH_2-CH_2-Cl$ ,  $-NHCOR_8$ , morpholino, nitro,  $SO_3H$ ,



$R_8$  and  $R_9$  being selected from  $C_1$ - $C_6$  alkyl groups and phenyl( $C_1$ - $C_4$ )alkyl groups and Ar being a  $C_6$ - $C_{14}$  aryl group,

-  $R_6$  is selected from hydrogen, halogens,  $C_1$ - $C_6$  alkyl or  $-(CH_2)_nR_{10}$  groups with  $R_{10}$  being selected from halogens or  $-OH$ ,  $(C_1$ - $C_6$ )alkoxy or  $-O-CO-(C_1$ - $C_6$ )alkyl groups and n between 1 and 6,  $-CN$ ,  $-CO_2Et$  or  $-COR_{11}$  groups with  $R_{11}$  being selected from  $C_1$ - $C_6$  and phenyl( $C_1$ - $C_4$ )alkyl groups, and  $-NR_{12}R_{13}$  groups with  $R_{12}$  and  $R_{13}$  selected, independently of one another, from hydrogen or  $C_1$ - $C_6$  alkyl, phenyl( $C_1$ - $C_4$ )alkyl or  $-(CH_2)_nR_{14}$  groups with  $R_{14}$

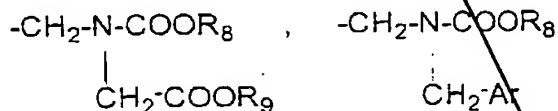
(C<sub>1</sub>-C<sub>6</sub>)alkoxy and -N(CH<sub>3</sub>)<sub>2</sub> groups and n between 1 and 6,

- R<sub>7</sub> is selected from hydrogen, groups of type (C<sub>1</sub>-C<sub>6</sub>) alkyl, phenyl(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NR<sub>15</sub>R<sub>16</sub> with R<sub>15</sub> and R<sub>16</sub> selected, independently of one another, from hydrogen, groups of type C<sub>1</sub>-C<sub>6</sub> alkyl and phenyl(C<sub>1</sub>-C<sub>4</sub>)alkyl and -(CH<sub>2</sub>)<sub>n</sub>R<sub>17</sub>, with R<sub>17</sub> selected from hydrogen, halogens or -OH or (C<sub>1</sub>-C<sub>6</sub>)alkoxy groups and n between 1 and 6,

and the addition salts of these compounds with pharmaceutically acceptable acids.

2. Compounds according to Claim 1, which are compounds of formulae I or Ia in which:

R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>5</sub> are selected from hydrogen, halogens, C<sub>1</sub>-C<sub>6</sub> alkyl groups, hydroxyl, -CHO, -OR<sub>8</sub>, -COOH, -CN, -CO<sub>2</sub>R<sub>8</sub>, -CONHR<sub>8</sub>, -CONR<sub>8</sub>R<sub>9</sub>, -NH<sub>2</sub>, -NHR<sub>8</sub>, -N(R<sub>8</sub>)<sub>2</sub>, -NH-CH<sub>2</sub>-CH<sub>2</sub>-N(CH<sub>3</sub>)<sub>2</sub>, -NHCOR<sub>8</sub>, morpholino, nitro, SO<sub>3</sub>H,



R<sub>8</sub> and R<sub>9</sub> being selected from C<sub>1</sub>-C<sub>6</sub> alkyl groups and Ar being a C<sub>6</sub>-C<sub>14</sub> aryl group.

3. Compounds according to Claim 1, which are compounds of formulae I or Ia in which:

R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>5</sub> are selected from hydrogen, halogens, C<sub>1</sub>-C<sub>6</sub> alkyl groups, hydroxyl, -OR<sub>8</sub>, NO<sub>2</sub>, -NH<sub>2</sub>, -NHR<sub>8</sub>, -NH(R<sub>8</sub>)<sub>2</sub>, -NH-CH<sub>2</sub>-CH<sub>2</sub>-N(CH<sub>3</sub>)<sub>2</sub>, -NH-CH<sub>2</sub>-CH<sub>2</sub>-Cl, -NHCOR<sub>8</sub>, R<sub>8</sub> being selected from C<sub>1</sub>-C<sub>6</sub> alkyl groups,

- R<sub>6</sub> is selected from hydrogen, -(CH<sub>2</sub>)<sub>n</sub>R<sub>10</sub> groups, with R<sub>10</sub> being selected from halogens, the -O-CO-CH<sub>3</sub> group, C<sub>1</sub>-C<sub>6</sub> alkyl groups and NR<sub>12</sub>R<sub>13</sub>

B1  
cont

groups with  $R_{12}$  and  $R_{13}$  selected, independently of one another, from hydrogen or  $C_1$ - $C_6$  alkyl, benzyl or  $-(CH_2)_nR_{14}$  groups, with  $R_{14}$  being selected from halogens or  $(C_1-C_6)$ alkoxy and  $-N(CH_3)_2$  groups and  $n$  between 1 and 6,

-  $R_7$  selected from hydrogen or groups of type  $(C_1-C_6)$  alkyl, benzyl,  $-NR_{15}R_{16}$  with  $R_{15}$  and  $R_{16}$  selected from hydrogen, groups of type  $C_1$ - $C_6$  alkyl and benzyl, and  $-(CH_2)_nR_{17}$ , with  $R_{17}$  selected from hydrogen, halogens or  $-OH$  or  $(C_1-C_6)$ alkoxy groups and  $n$  between 1 and 6,

and the addition salts of these compounds with pharmaceutically acceptable acids.

4. Compounds according to Claim 3, which are compounds of formulae I or Ia in which at least one of the  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$  and  $R_5$  groups is an  $OR_8$  group.

5. Compounds according to Claim 3, which are compounds of formulae I or Ia in which:

$R_1$  is selected from hydrogen, halogens or hydroxyl, methoxy, nitro,  $-NH_2$ ,  $-NHCH_3$ ,  $-NH-CH_2-CH_2-N(CH_3)_2$ ,  $-NH-CH_2-CH_2-Cl$  or  $-NHCOCH_3$  groups,

$R_2$  is hydrogen,

$R_3$  and  $R_5$  are selected from hydrogen or hydroxyl or methoxy groups

and the addition salts of these compounds with pharmaceutically acceptable acids.

6. Compounds according to Claim 3, which are compounds of formula (I):

11-methoxy-7H-pyrido[4,3,2-de][1,7]phenanthroline-7-one,

B1  
cont

- 5 11-chloro-7H-pyrido[4,3,2-de] [1,7]phenanthroline-  
7-one,  
4-methoxy-7H-pyrido[4,3,2-de] [1,7]phenanthroline-  
7-one,  
4,11-dimethoxy-7H-pyrido[4,3,2-de] [1,7] -  
phenanthroline-7-one,  
4,9-dimethoxy-7H-pyrido[4,3,2-de] [1,7] -  
phenanthroline-7-one,  
9-methoxy-7H-pyrido[4,3,2-de] [1,7]phenanthroline-  
10 7-one,  
9,11-dimethoxy-7H-pyrido[4,3,2-de] [1,7] -  
phenanthroline-7-one,  
3-acetoxymethyl-7H-pyrido[4,3,2-de] [1,7] -  
phenanthroline-7-one,  
15 3-acetoxymethyl-9-methoxy-7H-pyrido[4,3,2-de] -  
[1,7]phenanthroline-7-one,  
2-(2-chloroethyl)-7H-pyrido[4,3,2-de] [1,7] -  
phenanthroline-7-one,  
and the addition salts of these compounds with  
20 pharmaceutically acceptable acids.
7. Compounds according to Claim 3, which are  
compounds of formula (Ia):  
8-methoxy-7H-pyrido[4,3,2-de] [1,10]phenanthroline-  
25 7-one,  
8-chloro-7H-pyrido[4,3,2-de] [1,10]phenanthroline-  
7-one,  
4-methoxy-7H-pyrido[4,3,2-de] [1,10]phenanthroline-  
7-one,  
30 4,8-dimethoxy-7H-pyrido[4,3,2-de] [1,10] -  
phenanthroline-7-one,  
4,10-dimethoxy-7H-pyrido[4,3,2-de] [1,10] -  
phenanthroline-7-one,  
10-methoxy-7H-pyrido[4,3,2-de] [1,10] -  
35 phenanthroline-7-one,  
8,10-dimethoxy-7H-pyrido[4,3,2-de] [1,10] -  
phenanthroline-7-one,  
3-acetoxymethyl-7H-pyrido[4,3,2-de] [1,10] -  
phenanthroline-7-one,

131  
cont  
3-acetoxymethyl-9-methoxy-7H-pyrido[4,3,2-de]-  
[1,10]phenanthroline-7-one,  
2-(2-chloroethyl)-7H-pyrido[4,3,2-de][1,10]-  
phenanthroline-7-one,

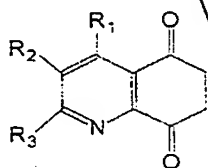
5 and the addition salts of these compounds with  
pharmaceutically acceptable acids.

8. Pharmaceutical composition comprising an effective  
amount of a compound selected from the compounds  
10 according to any one of Claims 1 to 7 for  
treating, by virtue of their cytotoxic properties,  
cancerous tumours and their metastases.

Sub R3  
15 9. Use of the compounds as defined in any one of  
Claims 1 to 7 in the manufacture of an anticancer  
medicament.

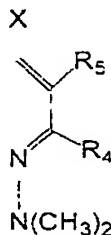
10. Process for the preparation of compounds according  
to Claim 1, which consists in:

20 a) reacting, according to a hetero Diels-Alder  
reaction, a quinolinedione of formula:



IV

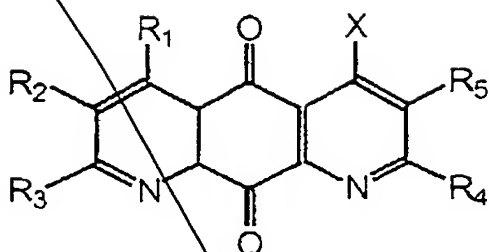
25 and an azadiene of formula



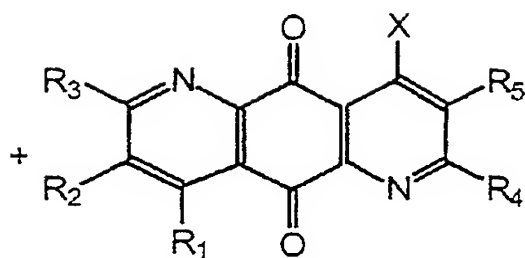
V

where X = CH<sub>3</sub>,

30 in order to obtain a mixture of compounds



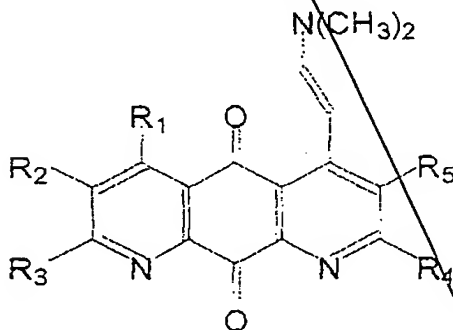
Formula II



Formula IIa

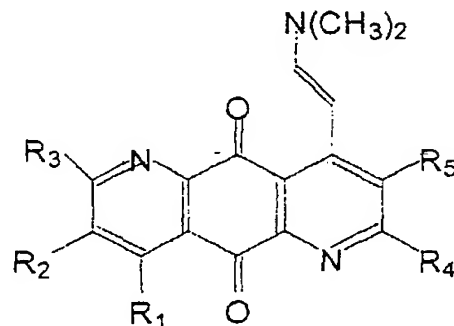
b) optionally separating the compounds of formulae II and IIa,

c<sub>1</sub>) subsequently reacting a compound of formulae II and or IIa with dimethylformamide dimethyl acetal, in order to obtain an enamine of formula:



Formula III

and/or



Formula IIIa

then functionalizing the enamines, in order to introduce the R<sub>6</sub> and/or R<sub>7</sub> substituents, and cyclizing, in order to obtain the compounds of formulae I and/or Ia,

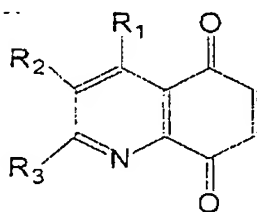
or

c<sub>2</sub>) functionalizing and cyclizing at the same time, in order to obtain the compounds of formulae I and/or Ia,

d) optionally separating the compounds of formulae I and Ia.

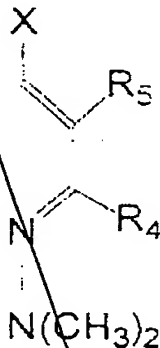
11. Process for the preparation of compounds according to Claim 1 of formulae I or Ia in which R<sub>6</sub> and R<sub>7</sub> are hydrogen atoms, which consists:

a) in reacting, according to a hetero Diels-Alder reaction, a quinolinedione of formula:



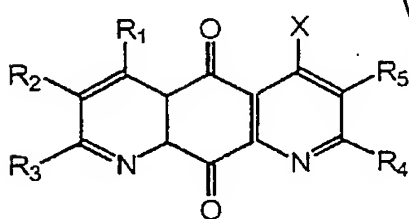
IV

and an azadiene of formula

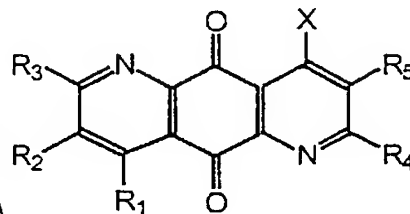


V

where X = CH<sub>2</sub>-CH<sub>2</sub>-NHBoc,  
in order to obtain a mixture of compounds



Formula II



Formula IIa

b) optionally separating the compounds of formulae II and IIa,

Sub  
A3

c) cyclizing a compound of formulae II and/or IIa,  
in order to obtain a compound of formulae I and/or  
Ia,

5 d) optionally separating the compounds of formulae  
I or Ia.

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12. Method for the treatment of a patient exhibiting a  
cancerous tumour, which consists in administering,  
10 to this patient, an effective amount of a compound  
as defined in Claim 1.

add  
A4

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